NYE 2014 Mojave Desert Low Elevation Snow Event

Prepared by: Chris Outler, General Forecaster

Snow in Yucca, AZ

Background

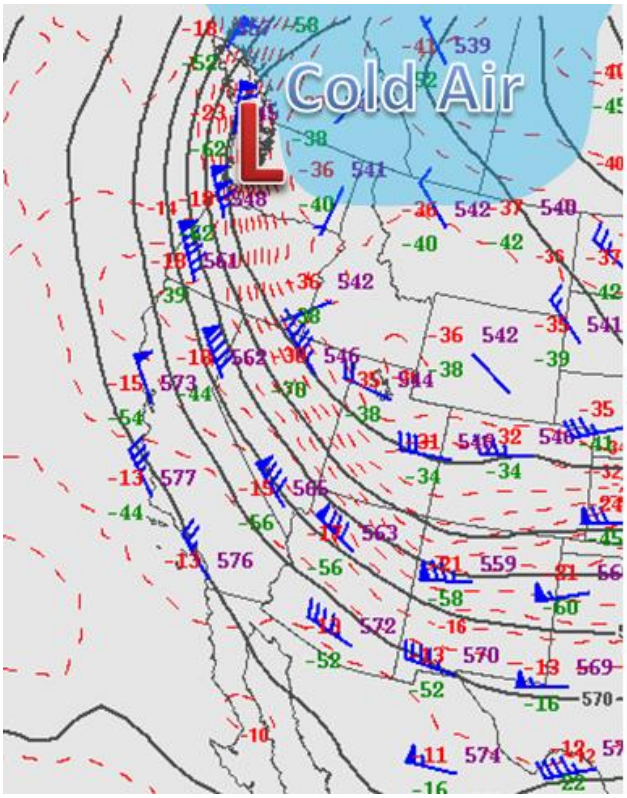
As early as the 25th of December, forecast models had begun to hint at the possibility of a cold storm system dropping into the desert southwest out of western Canada. Being the coldest part of the year, a storm system with origins north of the Canadian border always has the potential to bring low elevation snow and freezing temperatures to the Mojave Desert, and forecasters were immediately keying in on this possibility. There was some initial uncertainty in the exact track this storm would take, but it became clear some parts of the Mojave Desert were in for an unusual winter treat.

In the coming days, the storm system took shape as a large trough developed over the northern Rocky Mountains. Cold air poured into the Northwestern states and a piece of energy split off from the main trough and dug south into the Great Basin, taking a southerly track towards the Mojave Desert. As the storm drifted south, very cold air invaded the region setting the stage for the possibility of snowfall even in some low elevations not commonly accustomed to it.

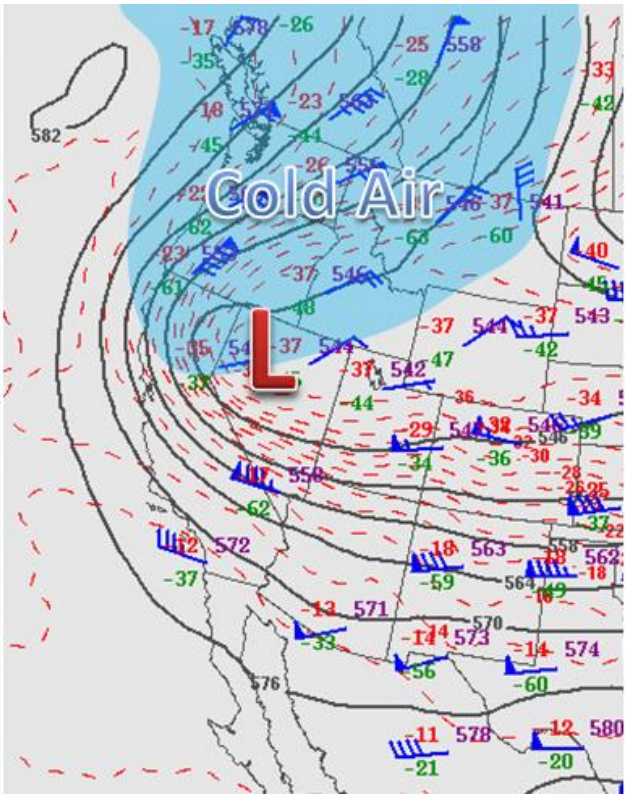
As the storm entered the Mojave Desert by the morning of the 31st, strong dynamics associated with the cold storm as well as some modest amounts of moisture allowed for precipitation to break out across much of the region, with snow being the dominant precipitation type even for elevations below 500 feet. As the day progressed, snow became heavy at times along the Colorado River and northwest Arizona, with reports of accumulating snow in Lake Havasu City, Needles, and Bullhead City, where snow is nearly unheard of.

Further north, the Las Vegas Valley received off and on snow flurries, with little accumulation due to a very dry low level airmass which had moved in on the north side of the storm. By late evening, the snow had begun to taper off across the entire region, but had deposited a rare winter snowfall to much of the lower Colorado River Valley and Northwest Arizona.

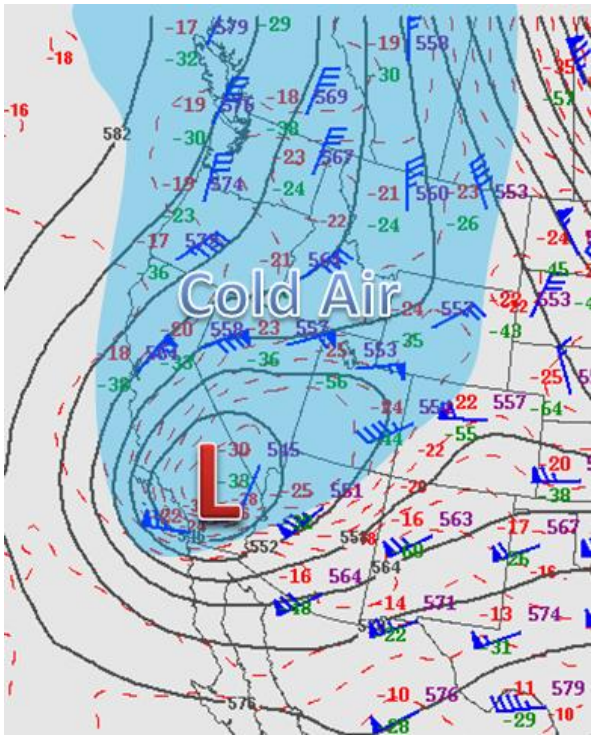
Observed Storm Track (500mb Map):



4 AM PST December 29th



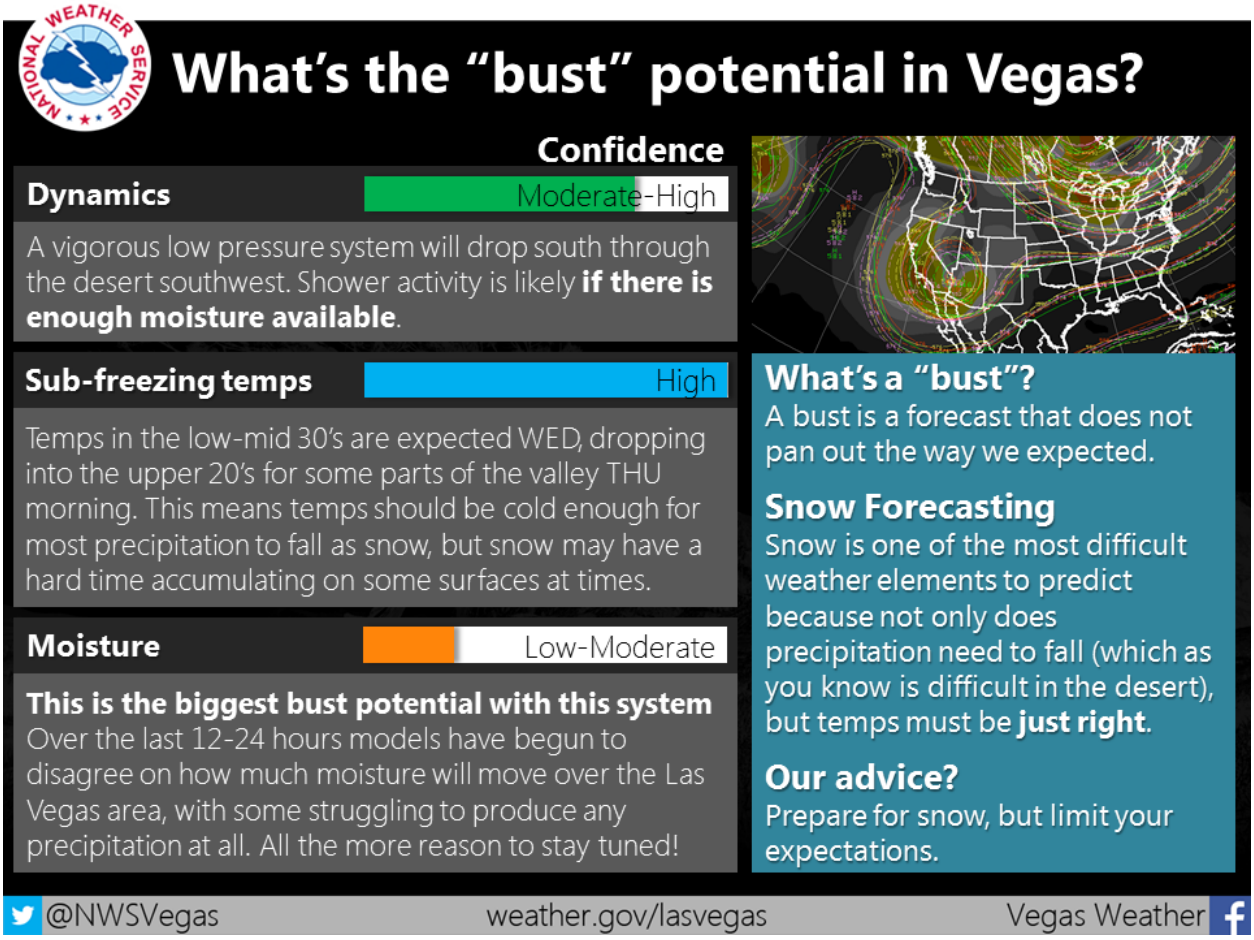
4 AM PST December 30th



4 AM PST December 31st

Uncertainty

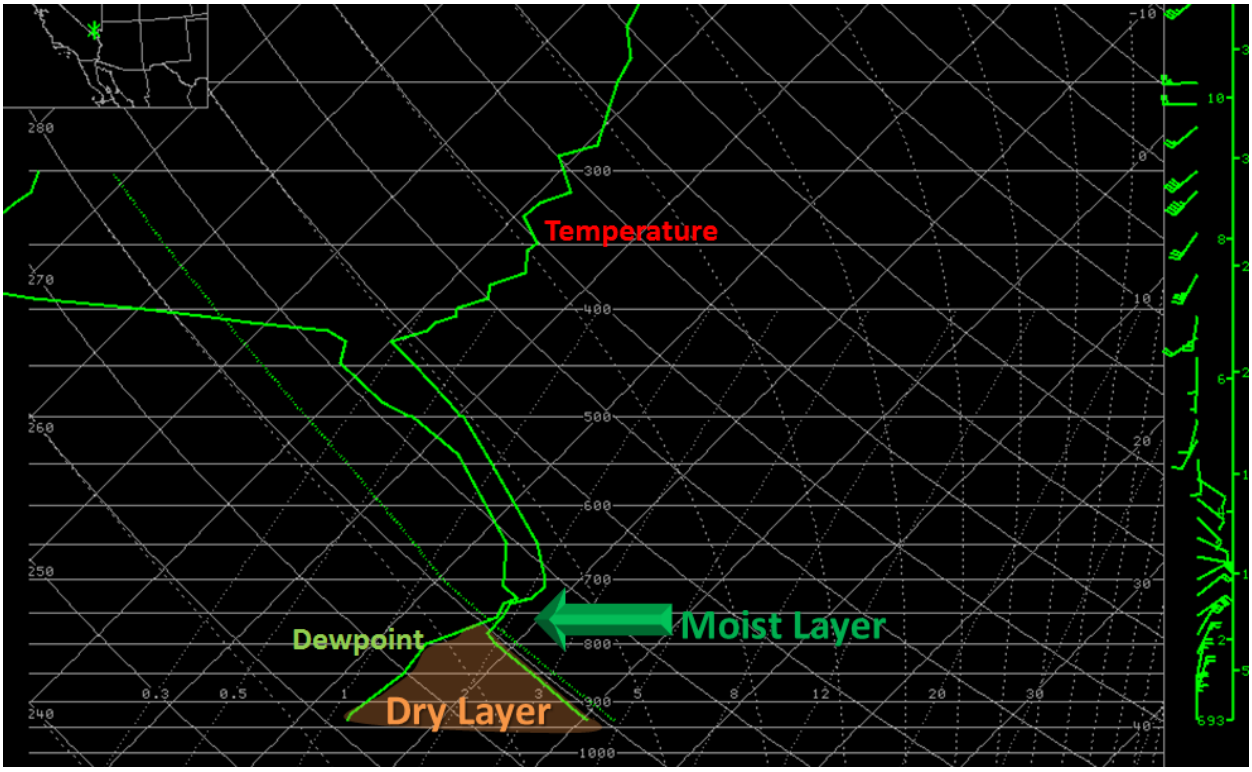
As the storm approached, there was concern about whether or not our forecast would "Bust", or in other words, be inaccurate due to any number of factors. In fact, a graphic was put together in the days prior to the event discussing this very possibility, as our forecast featured high confidence in temperatures cold enough for snow, but lower confidence that moisture levels would be high enough to produce snowfall. The graphic is shown below.



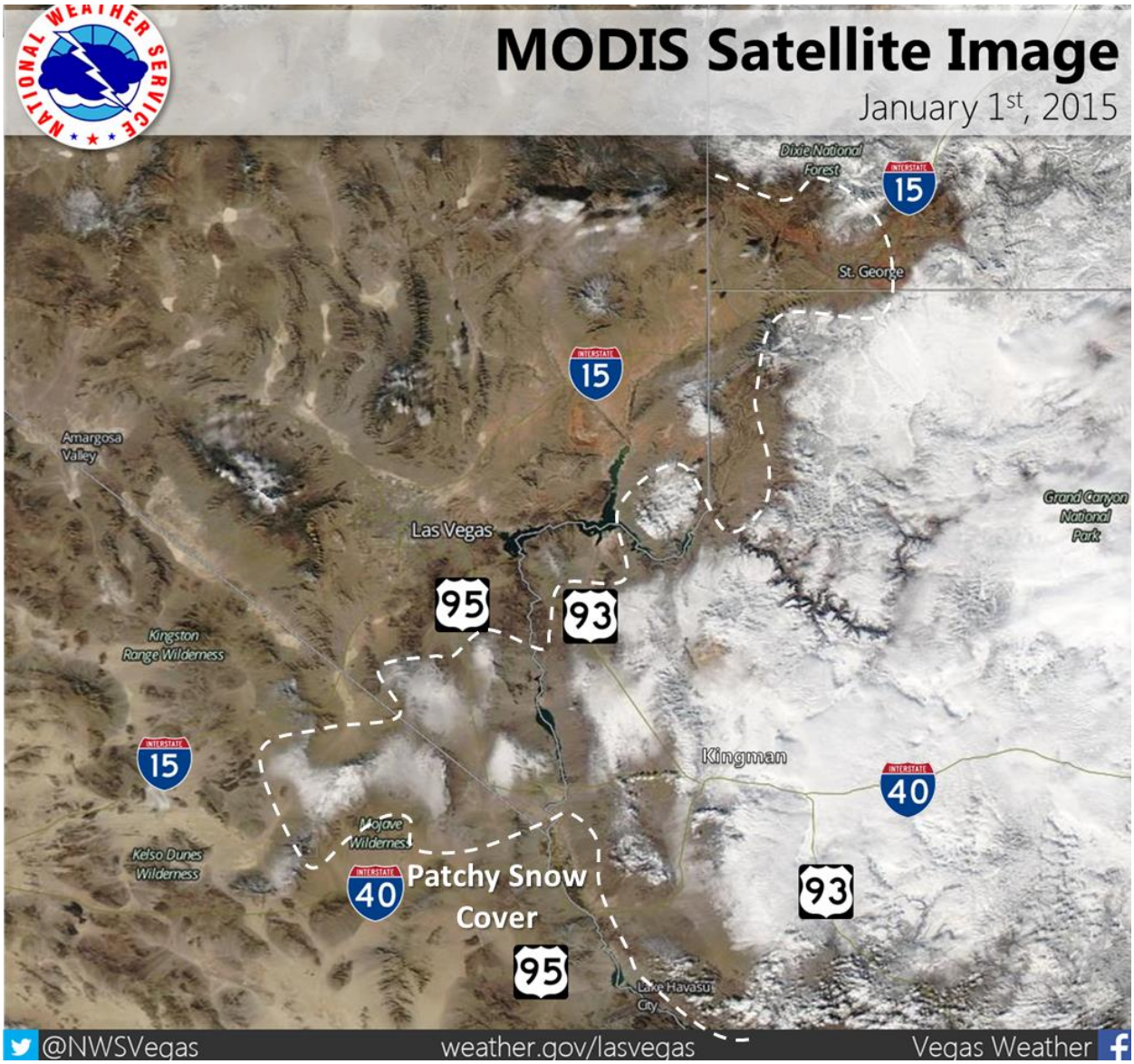
As time would prove, moisture levels in the Las Vegas Valley were insufficient for substantial snowfall, and only snow flurries developed. Further south however, low level moisture was greater and allowed for accumulating snows to develop along the Colorado River and Northwest Arizona, as well as some parts of the Yucca Valley in Southern California.

A closer look at why Las Vegas ended up snow free can be seen from this atmospheric sounding from the morning of the 31st taken in Las Vegas. In this plot, the line on the right depicts temperature, while the line on the left depicts moisture (dewpoint). When the lines are close together, that indicates saturation, while lines far apart indicate drier conditions. In this case, the lines are close together near the 750mb level (or around 8000 feet), allowing clouds and snow showers to develop, but closer to the ground the temperature and the dewpoint diverged,

indicating very dry air near the ground surface, causing much of the snow that was falling to evaporate.



While the dry layer prevented Las Vegas from seeing snow, higher low level moisture farther south allowed the snow to fall heavily across Laughlin, Bullhead City, Lake Havasu City, and Needles, many places which haven't seen snowfall in decades. The following morning, snow cover was visible across parts of the southern Nevada Desert and Northwest Arizona (see image below), while snowfall in the lower elevations had already melted away.



Storm Total Snowfall

Storm totals of as much as a foot of snow were reported across the higher terrain of Mohave County, while areas around Kingman received about half that. The lower elevations between 500 feet and 3000 feet received anything between a trace and several inches. The storm total summary statement is attached below which includes the full listing of snow reports.

PUBLIC INFORMATION STATEMENT
NATIONAL WEATHER SERVICE LAS VEGAS NV
1100 AM PST THU JAN 1 2015

...COLD NYE STORM BRINGS LOW ELEVATION SNOW TO THE MOJAVE DESERT...

A COLD STORM SYSTEM WITH ORIGINS IN CANADA MOVED INTO THE MOJAVE DESERT ON NEW YEARS EVE AND DEPOSITED WIDESPREAD SNOW TO SOME LOCATIONS WHICH HAVENT RECEIVED ACCUMULATING SNOW IN RECENT HISTORY. SIGNIFICANT ACCUMULATIONS WERE OBSERVED ACROSS NORTHWEST ARIZONA ABOVE 3000 FEET BUT NOTABLE ACCUMULATIONS WERE OBSERVED AS LOW AS 500 FEET AND ALONG THE COLORADO RIVER WHERE SNOW IS CONSIDERED QUITE RARE.

LISTED BELOW ARE THE SNOW TOTALS REPORTED VIA SPOTTER REPORTS...SOCIAL MEDIA...CLIMATE STATIONS...AND OTHER SOURCES.

LOCATION	STORM TOTAL SNOW (INCHES)	ELEVATION (FEET)
...ARIZONA...		
...MOHAVE...		
CEDAR HILLS 5 ESE	12.0	4278
PEACH SPRINGS	10.0	4780
VALLE VISTA	9.0	
PINE LAKE	8.0	6200
KINGMAN	6.5	3420
KINGMAN VICINITY	5.0-7.0	
MEADVIEW	5.0	3900
GOLDEN VALLEY	3.0	2805
CHLORIDE	3.0	4022
DOLAN SPRINGS	2.0-4.0	3400
EAST LAKE HAVASU CITY	1.0-2.0	600+
BULLHEAD CITY	1.0	605
FORT MOHAVE	1.0	523
LAKE HAVASU CITY	0.5	468
LAKE HAVASU CITY (COOP)	T	468
TOPOCK	0.5-1.0	456

...CALIFORNIA...

...SAN BERNARDINO...

YUCCA VALLEY	2.0	3249
JOHNSON VALLEY	0.5	3167
YUCCA MESA	0.5	3447
NEEDLES	0.5-1.0	890
NEEDLES AIRPORT	0.3	890

...NEVADA...

...CLARK...

MT. CHARLESTON	1.1	7450
CAL-NEV-ARI	1.0	2579
BOULDER CITY	0.5	2510
LAUGHLIN	TRACE	605
MCCARRAN AIRPORT	TRACE	2180
HENDERSON EXEC AP	TRACE	2458

OBSERVATIONS ARE COLLECTED FROM A VARIETY OF SOURCES WITH VARYING EQUIPMENT AND EXPOSURE. NOT ALL DATA LISTED ARE CONSIDERED OFFICIAL.

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NWS LAS VEGAS NV

Impacts and Support Provided

In the days prior to the storms arrival, substantial media interest was generated due to the possibility of accumulating snow falling across the Mojave Desert and the Las Vegas valley. Numerous interviews were conducted with both regional and national news outlets to spread the word of the potential for an unusual winter weather event. Daily email updates were provided to county and public officials to convey both the potential impacts of the storm as well as the uncertainty in the forecast.

By December 28th, a winter storm watch was issued for much of San Bernardino County in California, Clark and southern Nye counties in southern Nevada, and Mohave County in Northwest Arizona. On December 29th, a conference call was set up with those same counties emergency managers to brief them on how the forecast was trending. In addition, our forecast office was in frequent communication with McCarran Airport and even provided a phone brief to Alaska Airlines directly upon request for the possibility of snowfall at the airfield. As the focus for snowfall began to shift into Northwest Arizona, frequent updates on the expected road conditions were given to ADOT to help them better prepare for the dangerous winter weather.

As the event unfolded, heavy snowfall caused numerous traffic problems and dozens of crashes on area roadways. Interstate 40 eastbound was closed east of Kingman during much of the event, with periodic closures of Highway 93 between Kingman and Wikieup also reported. Highway 95 south of Searchlight was also closed for a period of time due to an overturned camper, and Union Pass between Bullhead City and Golden valley was also closed as heavy snow fell on the ridge line.

Records and Historical Perspective

...RECORDS SET OR TIED FROM RARE NEW YEARS EVE LOW ELEVATION SNOW...

A TRACE OF SNOW WAS REPORTED AT THE OFFICIAL CLIMATE STATION FOR LAS VEGAS, NEVADA AT MCCARRAN INTERNATIONAL AIRPORT ON DECEMBER 31, 2014. THIS TIED THE DAILY SNOW RECORD FOR NEW YEAR'S EVE OF A TRACE FIRST SET IN 1959 AND TIED IN 1964. OFFICIAL RECORDS FOR LAS VEGAS DATE BACK TO JANUARY 1937.

AT NEEDLES, CALIFORNIA A TOTAL OF 0.3 INCH OF SNOW ACCUMULATED AT THE NEEDLES AIRPORT ON DECEMBER 31, 2014. THIS BREAKS THE PREVIOUS DAILY SNOWFALL OF ZERO. THIS MARKED THE FIRST TIME EVER THAT ACCUMULATING SNOW HAS EVER FALLEN IN THE MONTH OF DECEMBER AT THIS LOCATION DATING BACK TO JANUARY 1888. IN THE PERIOD OF RECORD FOR NEEDLES, WHICH DATES BACK TO 1888, ONLY 4 OTHER DATES HAVE HAD SNOW FALL ON THEM - JANUARY 12, 1949 WITH 12.2 INCHES, JANUARY 25, 1949 WITH 2.0 INCHES AND JANUARY 11,

1949 WITH 1.0 INCH. THIS OFFICIALLY MAKES THE SNOWSTORM OF NEW YEAR'S EVE DAY 2014 THE 3RD GREATEST SNOWSTORM ON RECORD. THE LAST TIME SNOW WAS REPORTED AT THE NEEDLES AIRPORT WAS ON FEBRUARY 2, 1985 WHEN A TRACE FELL.

AT THE BULLHEAD CITY, ARIZONA COOPERATIVE WEATHER STATION A TOTAL OF 1.0 INCH OF SNOW FELL ON DECEMBER 31, 2014. THIS MARKED THE FIRST TIME IN OFFICIAL WEATHER STATION RECORDS, WHICH DATE TO NOVEMBER 1977, THAT ANY SNOW WAS OBSERVED AT THIS STATION. A CO-OP WEATHER STATION THAT OPERATED AT DAVIS DAM, ARIZONA JUST NORTH OF BULLHEAD CITY FROM FEBRUARY 1948 THROUGH JULY 1977, REPORTED 3.0 INCHES OF SNOW ON JANUARY 11, 1949. THIS IS THE LAST TIME MEASURABLE SNOW FELL IN THE BULLHEAD CITY AREA PRIOR TO THIS EVENT.

AT LAKE HAVASU CITY, ARIZONA, A TRACE OF SNOW WAS REPORTED FOR THE PERIOD ENDING ON THE MORNING OF DECEMBER 31, 2014 AND AGAIN ON JANUARY 1, 2015. THIS MARKS THE FIRST TIME SNOW WAS OFFICIALLY REPORTED AT THE LAKE HAVASU CITY CO-OP STATION SINCE RECORDS BEGAN IN SEPTEMBER 1967. A REPORT OF 6.0 INCHES FELL AT A NOW CLOSED CO-OP WEATHER STATION THAT OPERATED FROM AUGUST 1908 THROUGH AUGUST 1960 IN NEARBY TOPOCK, ARIZONA FROM JANUARY 11-12, 1949 WITH AN ADDITIONAL 1 INCH OF SNOW REPORTED FROM JANUARY 24-25, 1949. THESE ARE LIKELY THE ONLY OTHER INSTANCES OF ACCUMULATING SNOW IN THE LAKE HAVASU CITY AREA.

AT LAUGHLIN, NEVADA A TRACE OF SNOW WAS REPORTED FOR THE OBSERVATION OF THE MORNING OF DECEMBER 31ST, 2014 AND AGAIN ON JANUARY 1, 2015. THIS MARKS THE FIRST SNOW AT LAUGHLIN SINCE FEBRUARY 26, 1987. RECORDS AT LAUGHLIN DATE BACK TO 1983.

THE ABOVE INFORMATION IS PRELIMINARY AND IS SUBJECT TO A FINAL REVIEW AND CERTIFICATION BY THE NATIONAL CLIMATIC DATA CENTER.

Pictures

The following pictures were provided to us by local spotters and followers on social media. Thanks again to everyone who submitted their storm reports to us and any photographic evidence of this rare event.

North Foothills of Lake Havasu City. Photo credit : Bonnie Butterworth

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Lake Havasu City. Photo credit: Shayne Managbanag

Lake Havasu City. Photo credit: Ashley Bell

Needles, CA. Photo credit: Merlin Willis

Snow covered road signs. Photo credit: Sheri Felts Taylor

Dolan Springs. Photo credit: Mona Jensen

Dolan Springs. Photo credit: Mona Jensen

Snow in Bullhead City, AZ at an elevation of 504 feet. Photo credit: Daniel Marquez